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EXAMINER	
LEE, CHRISTOPHER E	

ART UNIT	PAPER NUMBER
2112	14

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/822,192	MOON ET AL.	
	Examiner	Art Unit	
	Christopher E. Lee	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 September 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Receipt Acknowledgement

1. Receipt is acknowledged of the Response to Restriction Requirement filed on 26th of January 2004. Applicants' election without traverse of Group IV (Claims 21-33) in Paper No. 13 is acknowledged. Currently, claims 21-33 are pending in this application.

2. Applicants are reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

In the claim 21, it recites the limitations "each tape cartridge having a predetermined storage capacity" in lines 2-3, and "each hard disk drive defining an electrical data storage capacity at least equal to the predetermined storage capacity of said tape cartridge being emulated" in lines 9-11. However, they are not described in the text disclosure as a proper antecedent basis for the claimed subject matter.

Drawings

5. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

6. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the doubly linked list heuristic including pointers to a last file marker and a next file marker in the claim 23, lines 3-4, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

7. Claims 21, 23, 25-28, 31 and 32 are objected to because of the following informalities:

In the claim 21, substitute "a said tape cartridge" by --said tape cartridge-- in line 10.

In the claim 23, substitute "a said hard disk drive" by --said hard disk drive-- in line 2.

In the claim 25, substitute "a said drive" by --said drive-- in line 21.

In the claims 26-28, substitute "the said one of the hard disk drives" by --said one of the hard disk drives-- in lines 2-3 of the claim 26, in line 2 of the claims 27 and 28, respectively.

In the claims 31and 32, substitute "a said hard disk drive" by --said hard disk drive-- in line 3, respectively.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs et al. [US 5,684,671 A; hereinafter Hobbs] in view of Yates et al. [US 6,496,791 B1; hereinafter Yates'791].

Referring to claim 21, Hobbs discloses a hard disk drive data archive system (i.e., data server in Fig. 4) comprising: a hot pluggable multi-drive magazine (i.e., disk drive rack 50 of Fig. 12; See col. 6, lines 44-47) comprising a housing (i.e., drive cage 56 of Fig. 13) and a plurality of hard disk drives (i.e., disk drives 57 in Fig. 13) installed within said housing (See col. 13, lines 1-4), and each hard disk drive upon installation being connected to receive power and data from said magazine in a controlled fashion (See col. 6, lines 37-47; i.e., wherein in fact that racks do not have to be completely populated, and disk drives are plug-and-play type and hot-swappable, meaning that they can be replaced without turning off data server implies that said hard disk drive upon installation being connected to receive power and data from said magazine in a controlled fashion).

Hobbs does not teach said hard disk drive data archive system is for emulating electrically a tape library including a multiplicity of tape cartridges each having a predetermined storage capacity, and each of said hard disk drives defining an electrical data storage capacity at least equal to said predetermined storage capacity of said tape cartridge being emulated.

Yates'791 discloses an interfaces for an open systems server providing tape drive emulation (See Abstract), wherein a hard disk drive data archive system (i.e., tape drive emulation system (TDE) 10 of Fig. 1A) is for emulating electrically a tape library (See col. 3, lines 9-14) including a multiplicity of tape cartridges (i.e., emulating a plurality of ETDs 55 in Fig. 1B) each having a predetermined storage capacity (i.e., capacity for containing tape data; See col. 3, lines 29-37), and each of a hard disk drives

(i.e., staging disks STDs 55 in Fig. 1B) defining an electrical data storage capacity (i.e., capacity for staging VTD on STD; See col. 2, lines 56-63) at least equal to said predetermined storage capacity of said tape cartridge being emulated (See col. 3, lines 24-37; i.e., wherein in fact that a virtual volume is a collection of data (i.e., stored on tape) and metadata (i.e., information generated by OSS) implies that said electrical data storage capacity (i.e., capacity on staging disk volume STD) is at least equal to said predetermined storage capacity (i.e., capacity for data on said tape cartridge to be emulated via virtual volume VTD)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said tape drive emulation, as disclosed by Yates'791, in said hard disk drive data archive system, as disclosed by Hobbs, for the advantage of providing an interface for a dump of a large amount of data (e.g., administrative data), which is not suitable to real-time short transactions, using a standard access method, such as tape or virtual tape (See Yates'791, col. 1, lines 36-48).

In fact, the limitation "said electrical data storage capacity of said hard disk drive being at least equal to said predetermined storage capacity of said tape cartridge being emulated" recited in the claim does not have any patentable advantage in the specification (See paragraph 4 of the instant Office Action), such as the reason of said electrical data storage capacity being at least equal to said predetermined storage capacity with any patentable advantage, i.e., the Examiner doubts why said electrical data storage capacity cannot be less than said predetermined storage capacity. Therefore, the limitation of "said electrical data storage capacity of said hard disk drive being at least equal to said predetermined storage capacity of said tape cartridge being emulated" in the claim is not patentably significant since it at most relates to the size of electrical data storage capacity under consideration which is not ordinarily a matter of invention. *In re Yount, 36 C.C.P.A. (Patents) 775, 171 F2.2d 317, 80 USPQ 141.*

Referring to claim 22, Hobbs, as modified by Yates'791, teaches a magazine receiving system (i.e., rack mount data server 10 in Fig. 1; Hobbs) connected to a host data processing system (i.e., system

management unit 70 in Fig. 4; Hobbs) and for physically receiving said magazine (See Hobbs, Fig. 4) and thereupon providing power and data connections to said magazine (See Hobbs, col. 12, lines 11-26), such that when said magazine is received within said magazine receiving system, said hard disk drives selectively receive power and data connections with said magazine receiving system (See Hobbs, col. 6, lines 37-47; i.e., wherein in fact that racks do not have to be completely populated, and disk drives are plug-and-play type and hot-swappable, meaning that they can be replaced without turning off data server implies that said hard disk drives selectively receive power and data connections (i.e., power and data connections are supplied to the populated hard disk drives) with said magazine receiving system when said magazine is received within said magazine receiving system), and archive system control means (i.e., LMS 60 of Fig. 1B; Yates'791) associated with said magazine receiving system (i.e., rack mount data server) for enabling virtual loading and unloading of said hard disk drives in response to host data processing system commands (i.e., LMS commands) issued to load and unload tape cartridges being emulated (See Yates'791, col. 3, lines 16-28).

11. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 5,684,671 A] in view of Yates'791 [US 6,496,791 B1] as applied to claims 21 and 22 above, and further in view of Yates et al. [US 6,049,848 A; cited by the Applicants; hereinafter Yates,848] and Taylor [US 6,467,025 B1].

Referring to claim 23, Hobbs, as modified by Yates'791, discloses all the limitations of the claim 23 except that does not expressly teach said hard disk drive implements a tape file mark structure in hard disk logical block address space as a double linked list heuristic including pointers to a last file marker and a next file marker.

Yates,848 discloses a system and method for performing high-speed tape positioning operations (See Abstract), wherein a hard disk drive (i.e., staging disk STD of Fig. 1A) implements a tape file mark

structure (i.e., tapemark table in Fig. 6) in hard disk logical block address space (See col. 5, lines 34-42 and line 66 through col. 6, line 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented said tape file mark structure, as disclosed by Yates'848, in said hard disk drive data archive system, as disclosed by Hobbs, as modified by Yates'791, so as to execute a tape file mark (i.e., tapemark) relative directives at a speed of table look-up ("electronic speed") instead of a sequential accessing ("mechanical speed") (See Yates'848, col. 2, lines 13-17).

Hobbs, as modified by Yates'791 and Yates'848, does not teach said tape file mark structure as a double linked list heuristic including pointers to a last file marker and a next file marker.

Taylor discloses a method utilizing doubly-linked loop (See Abstract), wherein a tape file mark structure (i.e., cache lines list in Fig. 2) as a double linked list heuristic including pointers to a last file marker and a next file marker (See col. 4, lines 47-53).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented said double linked list heuristic, as disclosed by Taylor, for said tape file mark structure, as disclosed by Hobbs, as modified by Yates'791 and Yates'848, for the advantage of providing a set of efficient primitive operations for addressing and manipulating said tape file mark structure (See Taylor, col. 2, lines 37-40).

Referring to claim 24, Yates'848 teaches each file mark structure (i.e., tapemark table in Fig. 6) occupies a separate sector in logical block address space (See col. 5, lines 34-42) of said drive (i.e., staging disk STD in Fig. 1A).

12. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 5,684,671 A] in view of Baca et al. [US 5,638,347 A; hereinafter Baca], Blackborow et al. [US 5,253,129 A; cited by the Applicant; hereinafter Blackborow], and Rinard [US 5,894,376 A].

Referring to claim 25, Hobbs discloses a method for archiving user data (i.e., functions of data server in Fig. 4) within an active data processing system (i.e., system management unit 70 in Fig. 4) comprising steps of: transferring said user data (i.e., client data) to be archived to a hard disk archive array (i.e., an array of disk drives 57 in Fig. 4) comprising at least one hot pluggable multi-drive magazine (i.e., disk drive rack 50 of Fig. 12; See col. 6, lines 44-47) having a housing (i.e., drive cage 56 of Fig. 13) and a plurality of hard disk drives (i.e., disk drives 57 in Fig. 13) installed within said housing (See col. 13, lines 1-4), each hard disk drive upon installation being connected to receive power and data from said magazine in a controlled fashion (See col. 6, lines 37-47; i.e., wherein in fact that racks do not have to be completely populated, and disk drives are plug-and-play type and hot-swappable, meaning that they can be replaced without turning off data server implies that said hard disk drive upon installation being connected to receive power and data from said magazine in a controlled fashion); and, a magazine receiving system (i.e., rack mount data server 10 in Fig. 1) connected to said active data processing system (i.e., system management unit) for physically receiving said magazine (See Fig. 4) and thereupon providing power and data connections to said magazine (See col. 12, lines 11-26), such that when said magazine is received within said magazine receiving system, said hard disk drives selectively receive power and data connections with said magazine receiving system (See col. 6, lines 37-47; i.e., wherein in fact that racks do not have to be completely populated, and disk drives are plug-and-play type and hot-swappable, meaning that they can be replaced without turning off data server implies that said hard disk drives selectively receive power and data connections (i.e., power and data connections are supplied to the populated hard disk drives) with said magazine receiving system when said magazine is received within said magazine receiving system).

Hobbs does not teach removing said magazine from said magazine receiving system connected to said active data processing system following completion of transfer of user data to be archived; installing said magazine in a data preservation vault.

Baca discloses a storage library system (Fig. 8), wherein a picker system 22 (Fig. 3) performs removing a magazine (i.e., a cartridge or magazine 15 in Fig. 1) from a magazine receiving system (i.e., library device 10 in Fig. 1) connected to an active data processing system (i.e., drive unit 20 of Fig. 1) following completion of transfer of user data to be archived (See col. 3, lines 19-22); installing said magazine in a data preservation vault (i.e., receptacle columns 11 and 12 in Fig. 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said picker system, as disclosed by Baca, in said active data processing system, as disclosed by Hobbs, so as a picker mechanism in said picker system to move said magazine (i.e., media) into and from said active data processing system (i.e., drive unit; See Baca, Abstract), which provides the advantage of sharing said active data processing system among said plurality of multi-drive magazines (i.e., cartridges or magazines).

Hobbs, as modified by Baca, does not teach said data preservation vault is in a secure location remote from a location of said active data processing system; and, periodically and selectively applying power to each one of said hard disk drives installed within said magazine in said data preservation vault during a drive testing interval, and carrying out drive performance checks upon a said drive during said drive testing interval.

Blackborow discloses a removable and transportable hard disk subsystem (See Abstract and Fig. 1), wherein a data preservation vault (i.e., the premises containing the system be secured against all intrusion) is in a secure location remote from a location of an active data processing system (i.e., from a location of large office building; See col. 1, line 55 through col. 2, line 8 and col. 3, lines 59-68).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied said concept of security using said removable and transportable hard disk subsystem, as disclosed by Blackborow, to said active data processing system, as disclosed by Hobbs, as

modified by Baca, for the advantage of providing a high security of said user data (i.e., files) from those who might seek access to privileged information (See Blackborow, col. 1, lines 21-28).

Hobbs, as modified by Baca and Blackborow, does not teach periodically and selectively applying power to each one of said hard disk drives installed within said magazine in said data preservation vault during a drive testing interval, and carrying out drive performance checks upon a said drive during said drive testing interval.

Rinard discloses an apparatus and method for monitoring read/write reliability of data storage device (See Abstract and Figs. 6 and 6A), wherein said method performs the step of periodically and selectively applying power to each one of hard disk drives (i.e., player/recorder devices 22, 24, 26 and 28 in Fig. 3) installed within a magazine (i.e., slot 74 of Fig. 3) in a data preservation vault (i.e., data cartridge library system 16 in Fig. 3) during a drive testing interval (i.e., during diagnostic test), and carrying out drive performance checks upon said drive during said drive testing interval (See col. 8, lines 33-46).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied said concept of periodic drive testing (i.e., periodic diagnostic test), as disclosed by Rinard, to said active data processing system, as disclosed by Hobbs, as modified by Baca and Blackborow, so as to identify said hard disk drives (i.e., player/recorder devices) experiencing read/write reliability problems (See Rinard, col. 8, lines 38-41).

Referring to claim 26, Rinard teaches read-verifying (i.e., read/write confidence test) archived data stored on said one of said hard disk drives being performance checked (See col. 8, lines 47-50).

13. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 5,684,671 A] in view of Baca [US 5,638,347 A], Blackborow [US 5,253,129 A], and Rinard [US 5,894,376 A] as applied to claims 25 and 26 above, and further in view of Tuttle [US 6,281,685 B1].

Referring to claim 27, Hobbs, as modified by Baca, Blackborow and Rinard, discloses all the limitations of the claim 27 including said read-verifying (i.e., read/write confidence test) archived data

stored on said one of said hard disk drives is carried out by said archive magazine receiving system with said drive (See Rinard, col. 8, lines 47-50), except that does not teach said read-verifying is performed using a limited bandwidth data and control connection.

Tuttle discloses a cable shield fault locator (See Abstract and Fig. 1), wherein read-verifying (i.e., generating electrical signal current and detecting a disturbance in the magnetic field; See col. 3, lines 6-14) is performed using a limited bandwidth data and control connection (See col. 4, lines 23-29). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said step of read-verifying (i.e., locating cable shield fault), as disclosed by Tuttle, in said archiving method, as disclosed by Hobbs, as modified by Baca, Blackborow and Rinard, for the advantage of providing for testing the cable shielding for electromagnetic integrity, and that can be used without disconnecting the cable under test (See Tuttle, col. 2, lines 47-51).

Referring to claim 28, Tuttle teaches the step of read-verifying archived data stored on said one of said hard disk drives (i.e., locating cable shield fault) is carried out by sending control signals (i.e., generating electrical signal current) to said drive (i.e., electronics unit 22 of Fig. 1) from an archive computer associated with said archive magazine receiving system (i.e., electronics unit 20 of Fig. 1) and receiving status and user data from said drive at said archive computer (i.e., detecting a disturbance in the magnetic field; See col. 3, lines 4-17).

14. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 5,684,671 A] in view of Baca [US 5,638,347 A], Blackborow [US 5,253,129 A], Rinard [US 5,894,376 A] and Tuttle [US 6,281,685 B1] as applied to claims 27 and 28 above, and further in view of Yates'791 [US 6,496,791 B1].

Referring to claim 29, Hobbs, as modified by Baca, Blackborow, Rinard and Tuttle, discloses all the limitations of the claim 29, except that does not expressly teach said archive computer having a network connection to an active data processing system and comprising further steps of receiving an

archived user data file retrieval request from said active data processing system via said network connection, retrieving said archived user data file from at least one of said hard disk drives of a magazine installed in said archive magazine receiving system and sending said retrieved archived user data file to said active data processing system via said network connection.

Yates'791 discloses an interfaces for an open systems server providing tape drive emulation (See Abstract), wherein an archive computer having a network connection (i.e., subsystem interface 55a and device interface 57 in Fig. 1B) to an active data processing system (i.e., Host 50 of Fig. 1B) and receiving an archived user data file retrieval request from said active data processing system (i.e., data access request from APPLs 52 in Fig. 1B) via said network connection (i.e., subsystem interface and device interface), retrieving said archived user data file (i.e., Application Data) from at least one of hard disk drives of a magazine (i.e., STDs in Fig. 1B) installed in an archive magazine receiving system (i.e., ATL 54 of Fig. 1B) and sending said retrieved archived user data file to said active data processing system via said network connection (See col. 3, line 1 through col. 4, line 14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said method steps of tape drive emulation, as disclosed by Yates'791, in said archiving method, as disclosed by Hobbs, as modified by Baca, Blackborow, Rinard and Tuttle, for the advantage of providing an interface for a dump of a large amount of data (e.g., administrative data), which is not suitable to real-time short transactions, using a standard access method, such as tape or virtual tape (See Yates'791, col. 1, lines 36-48).

15. Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 5,684,671 A] in view of Baca [US 5,638,347 A], Blackborow [US 5,253,129 A], and Rinard [US 5,894,376 A] as applied to claims 25 and 26 above, and further in view of Yates'791 [US 6,496,791 B1].

Referring to claim 30, Hobbs, as modified by Baca, Blackborow and Rinard, discloses all the limitations of the claim 30 except that does not teach the step of emulating a cartridge tape library and

including the step of assigning each said hard disk drive to emulate a tape cartridge of said cartridge tape library.

Yates'791 discloses an interfaces for an open systems server providing tape drive emulation (See Abstract), wherein emulating a cartridge tape library (i.e., tape drive emulation system (TDE) 10 of Fig. 1A; See col. 3, lines 9-14) and assigning a hard disk drive (i.e., staging disks STDs 55 in Fig. 1B) to emulate a tape cartridge of said cartridge tape library (i.e., emulating a plurality of ETDs 55 in Fig. 1B). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said method steps of tape drive emulation, as disclosed by Yates'791, in said archiving method, as disclosed by Hobbs, as modified by Baca, Blackborow and Rinard, for the advantage of providing an interface for a dump of a large amount of data (e.g., administrative data), which is not suitable to real-time short transactions, using a standard access method, such as tape or virtual tape (See Yates'791, col. 1, lines 36-48).

Referring to claim 31, Yates'791 teaches assigning each hard disk drive (i.e., staging disk STD in Fig. 1B) to emulate a tape cartridge (i.e., emulating a plurality of ETDs 55 in Fig. 1B) is carried out by associating said hard disk drive with a single tape cartridge (See col. 2, lines 56-63) of a cartridge tape library (i.e., ATL 54 of Fig. 1B).

16. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 5,684,671 A] in view of Baca [US 5,638,347 A], Blackborow [US 5,253,129 A], Rinard [US 5,894,376 A] and Yates'791 [US 6,496,791 B1] as applied to claims 30 and 31 above, and further in view of Yates'848 [US 6,049,848 A] and Taylor [US 6,467,025 B1].

Referring to claim 32, Hobbs, as modified by Baca, Blackborow, Rinard and Yates'791, discloses all the limitations of the claim 32 except that does not expressly teach implementing a tape file mark structure in logical block address space of said hard disk drive as a double-linked-list heuristic including pointers to a last file marker and a next file marker.

Yates,848 discloses a system and method for performing high-speed tape positioning operations (See Abstract), wherein a hard disk drive (i.e., staging disk STD of Fig. 1A) implements a tape file mark structure (i.e., tapemark table in Fig. 6) in logical block address space of hard disk drive (See col. 5, lines 34-42 and line 66 through col. 6, line 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented said tape file mark structure, as disclosed by Yates'848, in said archiving method, as disclosed by Hobbs, as modified by Baca, Blackborow, Rinard and Yates'791, so as to execute a tape file mark (i.e., tapemark) relative directives at a speed of table look-up ("electronic speed") instead of a sequential accessing ("mechanical speed") (See Yates'848, col. 2, lines 13-17).

Hobbs, as modified by Baca, Blackborow, Rinard, Yates'791 and Yates'848, does not teach said tape file mark structure as a double linked list heuristic including pointers to a last file marker and a next file marker.

Taylor discloses a method utilizing doubly-linked loop (See Abstract), wherein a tape file mark structure (i.e., cache lines list in Fig. 2) as a double linked list heuristic including pointers to a last file marker and a next file marker (See col. 4, lines 47-53).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented said double linked list heuristic, as disclosed by Taylor, for said tape file mark structure, as disclosed by Hobbs, as modified by Baca, Blackborow, Rinard, Yates'791 and Yates'848, for the advantage of providing a set of efficient primitive operations for addressing and manipulating said tape file mark structure (See Taylor, col. 2, lines 37-40).

Referring to claim 33, Yates'848 teaches recording each file mark structure (i.e., tapemark table in Fig. 6) within a separate sector in logical block address space (See col. 5, lines 34-42) of said drive (i.e., staging disk STD in Fig. 1A).

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

With regard to Tape Emulation System,

LeCrone et al. [US 6,341,329 B1] disclose virtual tape system.

Plotkin et al. [US 5,297,124 A] disclose tape drive emulation system for a disk drive.

Georgis [US 6,128,698 A] discloses tape drive emulator for removable disk drive.

Yates et al. [US 6,324,497 B1] disclose tape drive emulation system including tape library interface.

With regard to Disk Array,

Corrington et al, [US 6,076,142 A] disclose user configurable RAID system with multiple data bus segments and removable electrical bridges.

Schreiber et al. [US 6,341,333 B1] disclose method for transparent exchange of logical volumes in a disk array storage device.

Nunnelley et al. [US 5,423,046 A] disclose high capacity data storage system using disk array.

With regard to Storage Media,

Fisher et al. [US 5,870,732 A] disclose inventory method for logical volumes in an automated storage library.

Kaneda et al. [US 6,351,825 B1] disclose method for managing failed storage media.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher E. Lee whose telephone number is 703-305-5950. The examiner can normally be reached on 9:00am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark H. Rinehart can be reached on 703-305-4815. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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